BISON CONTROL PROGRAM
ANNUAL REPORT OF
SURVEY ACTIVITIES
DECEMBER 1998 - APRIL 1999

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Northwest Territories Resources, Wildlife & Economic Development

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ABSTRACT

Bovine tuberculosis *(Mycobacterium bovis)* and brucellosis *(Brucella abortus)* are present in bison herds in and around Wood Buffalo National Park, and the Slave River Lowlands. In 1987, the Bison Control Area (BCA), along with a surveillance program, was created to minimize the risk of disease transmission to the disease-free Mackenzie and Nahanni-Liard bison herds in the Northwest Territories. We used a Cessna 150 to fly 14 shoreline patrols along the northern boundary of the BCA on a weekly basis between 23 December 1998 and 8 April 1999. We used 42.7 hours to fly those shoreline patrols. We used a Cessna 185 to fly two monthly semi-comprehensive aerial surveys of BCA Zone I in January and February 1999 (13.6 and 16.3 hours respectively), and the annual comprehensive survey of BCA Zones I and II from 16 to 20 March 1999 (44.7 hours). In total, we flew 117.3 hours to systematically survey the BCA during the 1998 - 1999 surveillance season; we did not observe any bison or bison sign, nor did we receive any public reports of confirmed bison sightings in the BCA.

TABLE OF CONTENTS

ABSTRACT iii

LIST OF FIGURES vii

LIST OF TABLES ix

INTRODUCTION 1

The Bison Control Area Program 4

Goal and Objectives 5

METHODS 8

RESULTS AND DISCUSSION 10

Shoreline Patrols and Surveillance Surveys 10

Wildlife Observations 10

Communications 25

Community Consultations and Concerns 26

RECOMMENDATIONS 27

ACKNOWLEDGMENTS 29

LITERATURE CITED 31

LIST OF DATABASES 34

APPENDIX A. Risk assessment on bovine brucellosis and tuberculosis in Wood Buffalo National park and area 35

APPENDIX B. Poster distributed to user groups and commercial operators 37

APPENDIX C. Public Service Announcement aired on radio 38

APPENDIX D. Advertisement published in "UP HERE " magazine 39

APPENDIX E. Trout Lake meeting report 40

LIST OF FIGURES

Figure 1. Location of healthy free-roaming and captive bison herds, and free-roaming bison herds infected with brucellosis and tuberculosis 2

Figure 2. Location of the Bison Control Area and surveillance zones..... 6

Figure 3. (3.1-3.14) Flight lines and wildlife observations recorded during shoreline patrols of the northern boundary of the BCA 11-17

Figure 4. (4.1-4.2) Semi-comprehensive aerial survey of Zone I of the Bison Control Area, (January and February 1999)..... 19-20

Figure 5. Comprehensive aerial survey of Zone I and II of the Bison Control Area (16 March to 20 Mar 1999)..... 21

Figure 6. Distribution of bison sightings reported since 1976 in the region west of Wood Buffalo National Park and south of the Mackenzie River... 22

Figure 7. Possible bison habitat identified during aerial surveys in 1997-1999 24

LIST OF TABLES

Table 1. Summary of shoreline patrols in the Bison Control Area from December 1998 to April 1999 18

Table 2. Summary of surveillance flights in the Bison Control Area during January, February and March 1999. 18

Table 3. Recorded sightings of large mammals observed during all surveillance flights in the Bison Control Area, December 1998 - April 1999 23

INTRODUCTION

Free-ranging bison in and around Wood Buffalo National Park (WBNP) and the Slave River Lowlands (SRL) are infected with bovine tuberculosis and brucellosis (Tessaro *et al.* 1990, Joly and Messier 1999). These diseased bison threaten the disease-free status of the Mackenzie wood bison herd (Tessaro *et al.* 1993, APFRAN 1998), the Hay-Zama herd located in northwest Alberta, and the presumed disease-free status of the Nahanni-Liard herd located near the Mackenzie Mountains (Gates *et al.* 1992a) (Figure 1). The diseased bison also present an obstacle to the reestablishment of other healthy free-roaming herds in the region (Gates *et al.* 1992b, Gates *et al.* in press). As well, the commercial bison ranching industry is growing rapidly in the region and the continued existence of infected free-roaming herds is perceived to be a threat to the disease free status of commercial ranching operations (APFRAN 1998).

Risk of infection to healthy bison has been a chronic management problem since the introduction of 6,673 diseased plains bison to WBNP from 1925 to 1928 (Wobeser 1992). The Bison Disease Task Force (1988) reviewed the issue in 1988, which lead to a Federal Environmental Assessment and Review Process (EARP) (Northern Diseased Bison Environmental Assessment Panel 1990). Recommendations made by the EARP (1990) to eradicate diseased bison in WBNP and replace them with disease-free wood bison were met with widespread public opposition. Difficulties in resolving the issue lead to formation of the Northern Buffalo Management Board (NBMB) in 1992 (Northern Buffalo

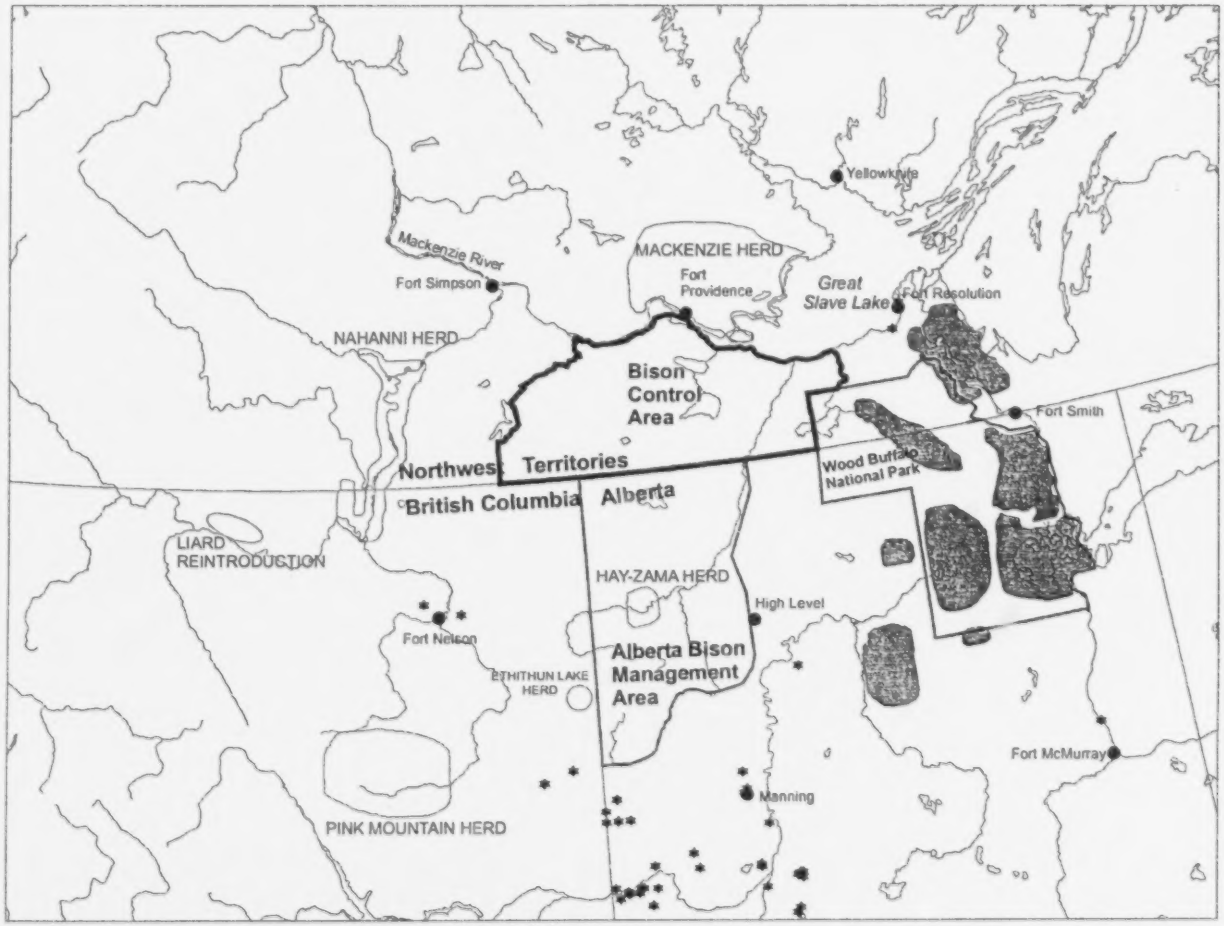

Figure 1. Location of healthy free-roaming (light shading) and captive (stars) bison herds, and free-roaming bison herds infected with brucellosis and tuberculosis (dark shading)

Management Board 1992). The NBMB concluded that significant information gaps existed in the epidemiology of the two diseases, the ecological role of the diseases, and the possible effects of management action on other fundamental aspects of the ecosystem. The NBMB recommended that a three-year, $18 million research program be conducted prior to the development of a final action plan (NBMB 1992).

In 1995, the federal government responded to recommendations of the Environmental Assessment Panel and of the NBMB by announcing a $2.5 million, five-year Bison Research and Containment Program (BRCP). The BRCP's three main components were risk assessment, disease containment, and ecological research (Chisholm *et al.* 1998, Huff and Chisholm 1999). The Minister of Canadian Heritage appointed a multi-stakeholder Research Advisory Committee (RAC) to advise Parks Canada on the planning, implementation, and evaluation of bison research. To date, the BRCP has funded one major study on the population level effects of tuberculosis and brucellosis on WBNP bison (see Joly and Messier 1999).

In March 1996, because of ongoing concerns of the commercial bison industry, the Canadian Bison Association requested the Canadian Food Inspection Agency to conduct a formal risk assessment. The objective was to determine the risk of infection with tuberculosis and/or brucellosis from bison in WBNP and surrounding area during a 12 month period, for each of three "at risk" groups: commercial cattle, commercial captive bison and disease-free, free-

ranging bison. In September 1998, the Animal, Plant and Food Health Risk Assessment Network (APFRAN) published a risk assessment and concluded that disease-free, free-ranging bison had the highest probability of becoming infected with bovine brucellosis and/or tuberculosis (Appendix A) (APFRAN 1998). In October 1998, following release of the risk assessment, Axys Environmental Consulting Ltd. produced a research framework, which proposed further development of a comprehensive risk model that would include biophysical information such as terrain and habitat, as well as local ecological knowledge sources (Axys Environmental Consulting Ltd. 1998). Since the initial framework was proposed, the project has developed into a collaborative program headed by the University of Calgary (Gates *et al.* 1999).

The Bison Control Area Program

In 1987, the Government of the Northwest Territories (GNWT) implemented a program to reduce the risk of contact between infected and disease-free bison (Gates and Gray 1992; Gates *et al.* 1992b). The program entailed defining an area - the Bison Control Area (BCA) - from which bison are excluded through surveillance and active management. The BCA originally included land south of the Mackenzie River, and north of the Mackenzie Highway between Mills Lake (near Fort Providence) and Hay River. In 1990, the BCA was expanded to encompass the area between the Alberta-NWT border and southern shoreline of the Mackenzie River; the western boundary was delineated by Trout River; the

eastern boundary was outlined by the Buffalo River and western boundary of WBNP (Figure 2). Presently, the BCA encompasses 3 936 339 ha.

Since 1993, the Bison Control Program (BCP) has been jointly funded by the GNWT (Department of Resources, Wildlife & Economic Development) and the Government of Canada (Department of Canadian Heritage). Participation of Canadian Heritage is within the context of its five-year Bison Research and Containment Program initiated in 1995. Cost of surveying the BCA is jointly funded under a Memorandum of Understanding between the two agencies.

The objectives of the BCP are to detect and remove any bison in the BCA, and to prevent establishment of bison herds or individuals in this area[1]. These objectives serve the goal of lowering the risk of contact between bison in non-infected and infected herds. In this report, we summarise results of the BCP for the 1998-1999 surveillance season (December 1998 - April 1999).

Goal and Objectives

The specific goal of the BCP in the Northwest Territories is to reduce the risk of infection of the Mackenzie and Nahanni-Liard herds with tuberculosis and brucellosis. Objectives of the program are threefold:

---

[1] Wood bison (*Bison bison athabascae*) are considered a threatened subspecies of North American bison by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); they are listed on Appendix II by the Convention on International Trade in Endangered Species (CITES). But because of the disease risk, any bison found in the BCA are considered nuisance wildlife under Section 61 of the NWT Wildlife Regulations Act (Government of the Northwest Territories 1992). This regulation states that any bison sighted in the BCA may be shot by NWT residents.

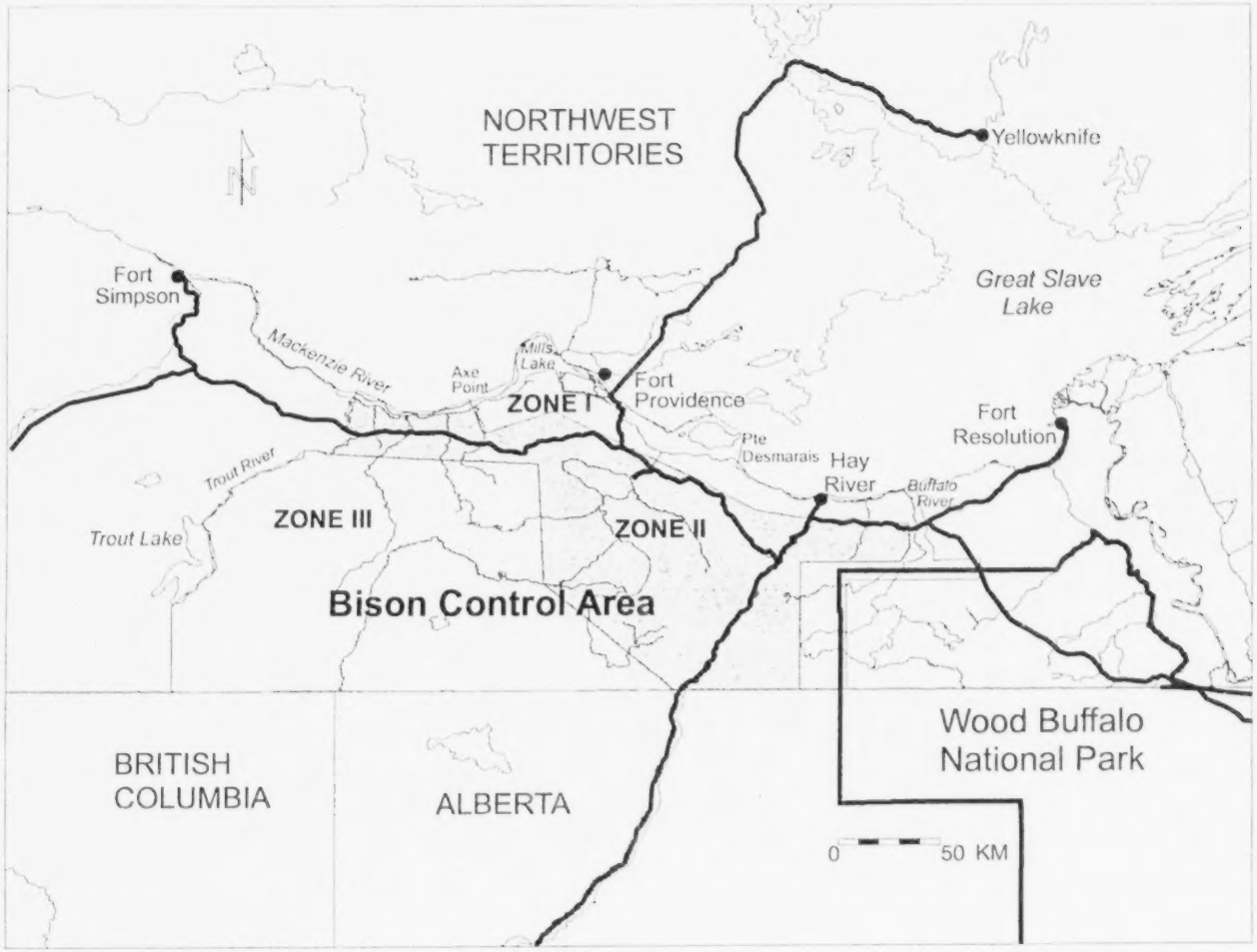

Figure 2. Location of the Bison Control Area and surveillance zones.

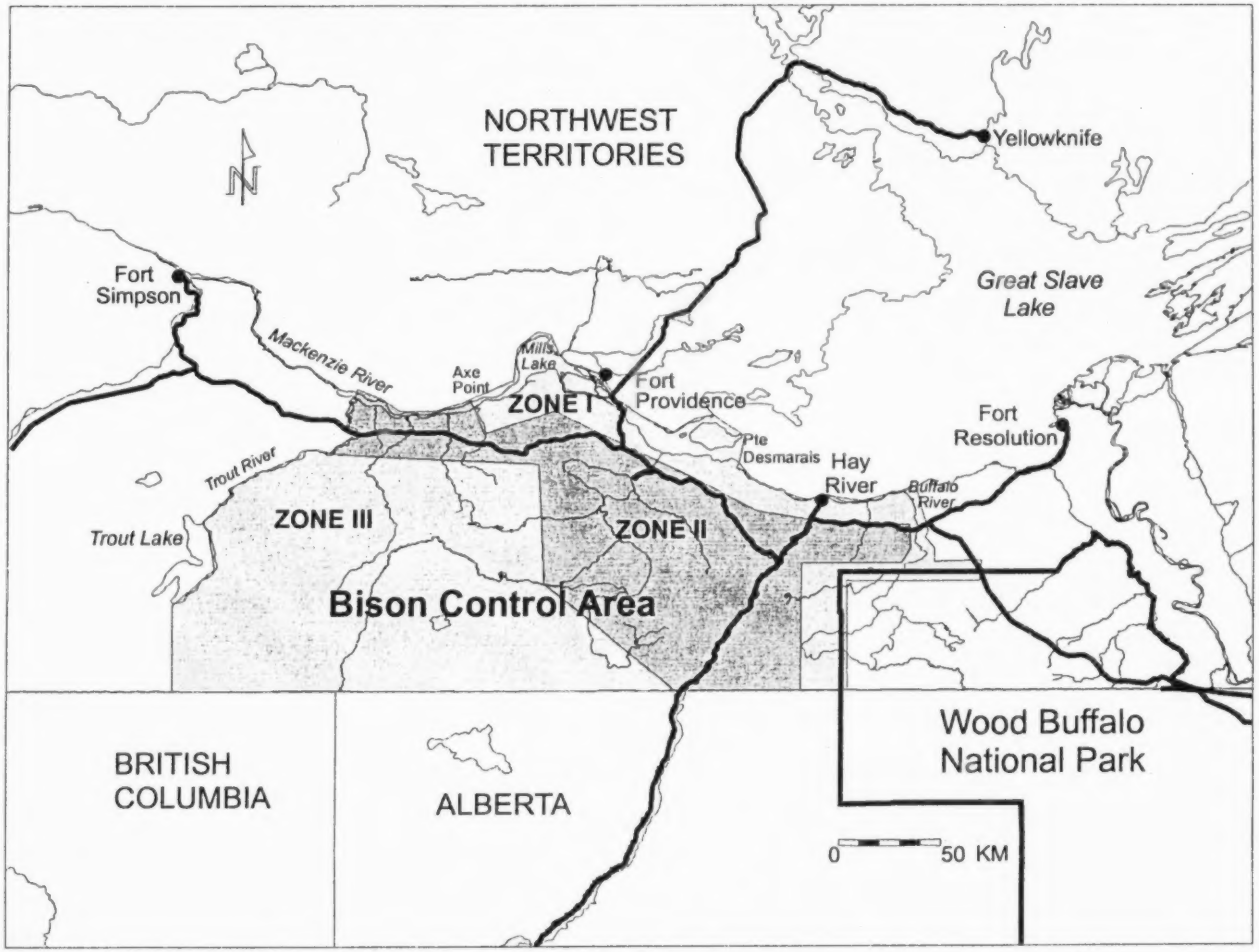

Figure 2. Location of the Bison Control Area and surveillance zones.

1) Continue surveillance of the Bison Control Area;

2) Maintain the Bison Control Area free of bison and prevent the establishment of any herds within its boundaries; and

3) Increase public awareness of the Bison Control Program.

METHODS

We adopted survey methodology used in previous years (Gates and Gray 1992, Gates *et al.*1992b, Williamson *et al.* 1995, Antoniak and Gates 1996, Bohnet and Gates 1997, Boulanger *et al.* 1999) to assure repeatability and comparability of wildlife sightings.

The BCA is stratified into three discrete zones (Figure 2). Survey effort (i.e., use of aircraft hours), and frequency of monitoring is allocated according to the likelihood of bison moving into an area. Consequently, this survey design requires frequent (i.e., weekly) surveys of the shoreline areas (BCA Zone I) that are closest to the range of the Mackenzie bison herd and the range of bison in WBNP. Less frequent surveys (i.e., monthly semi-comprehensive and annual comprehensive) are used to survey larger areas (BCA Zones I and II) in the BCA. We did not conduct surveys in Zone III of the BCA.

As part of this survey design, we flew three different types of aerial surveys to systematically survey the BCA throughout the surveillance season. The first type of survey was a weekly shoreline patrol of the high-risk area (Zone I) between Axe Point and Pointe Desmarais (Figure 2). This survey was conducted at approximately seven-day intervals and had a planned flight time of approximately three hours per patrol. The second type of survey was a monthly semi-comprehensive surveillance flight of Zone I. This survey covers a larger area and requires about 15 hours to complete. The final type of survey was a one-time, annual comprehensive surveillance survey of Zones I and II. For this

annual comprehensive survey, we allocated approximately 45 hours of flight time.

We adapted flight paths from previous surveys to plan our routing for aerial surveys in the 1998-1999 surveillance season. However, actual flight paths were flown in a flexible, meandering manner to allow for variations in terrain, and habitat, and to follow animal tracks when required. This allowed us to survey the area with greatest possible coverage given available flying hours.

Shoreline patrols were flown in a Cessna 150 and all other surveillance flights were conducted in a Cessna 185. The shoreline patrols were conducted by a community representative in Fort Providence, whereas the Bison Control Technician conducted the monthly surveillance flights of Zone I and the annual comprehensive survey of Zones I and II with assistance of community representatives. Survey aircraft were flown at approximately 250 to 300 metres above ground level at a speed of 140-160 km/hr.

Although we made every attempt to conduct aerial surveys during optimum snow and light conditions, some flights were conducted in less suitable conditions in order to maintain adequate and regular surveillance. Wildlife observations during weekly shoreline patrols were recorded on 1 : 250 000 scale (National Topographic Series) maps. All observations of large mammals (caribou, moose, and wolves) during the monthly semi-comprehensive and annual comprehensive flights were recorded with a Global Positioning System (GPS) and then downloaded to a computer database file.

RESULTS AND DISCUSSION

Shoreline Patrols and Surveillance Surveys

We initiated weekly shoreline patrols on 23 December 1998 and continued until 14 April 1999 (Figures 3.1 – 3.14). Total flight time for the 14 shoreline patrols was 42.7 hours (Table 1) with a mean duration of 3.1 ± 0.4 hours.

We conducted two monthly surveillance flights of BCA Zone I in January and February 1999 respectively (Figures 4.1 – 4.2). Total time spent on monthly semi-comprehensive surveillance flights was 29.9 hours with a mean duration of 15.0 ± 1.4 hours per flight. The annual comprehensive surveillance flight of BCA Zones I and II was conducted from 16 March to 20 March 1999 (Figure 5) and required 44.7 hours (Table 2). In total we spent 117.3 hours surveying the BCA in the 1998-1999 surveillance season.

Wildlife Observations

Although bison have been observed in the BCA in the past (Figure 6), we did not observe any bison, nor did we receive any reports of bison sightings in the BCA during the 1998-1999 surveillance season. Also, we did not observe any attempts by bison (*i.e.*, fresh tracks) to cross the Mackenzie River during surveillance flights. All bison observed during shoreline patrols or surveillance flights were located on the north side of the Mackenzie River in the Mackenzie Bison Sanctuary (MBS) (see Figures 3.1 – 3.14, Figures 4.1 – 4.2, and Figure 5).

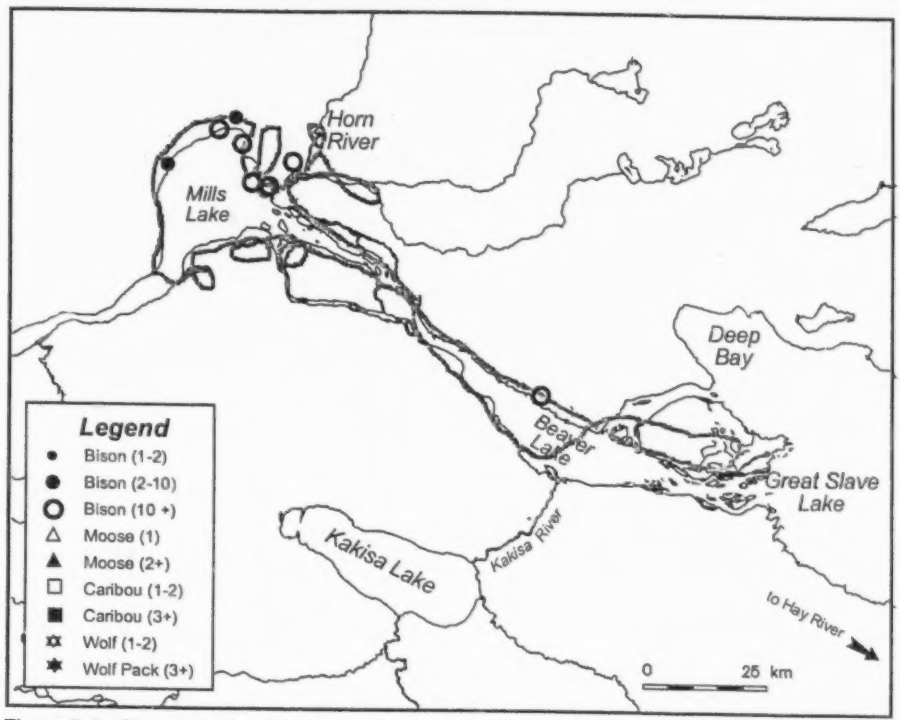

Figure 3.1. Shoreline patrol, 23 December 1998.

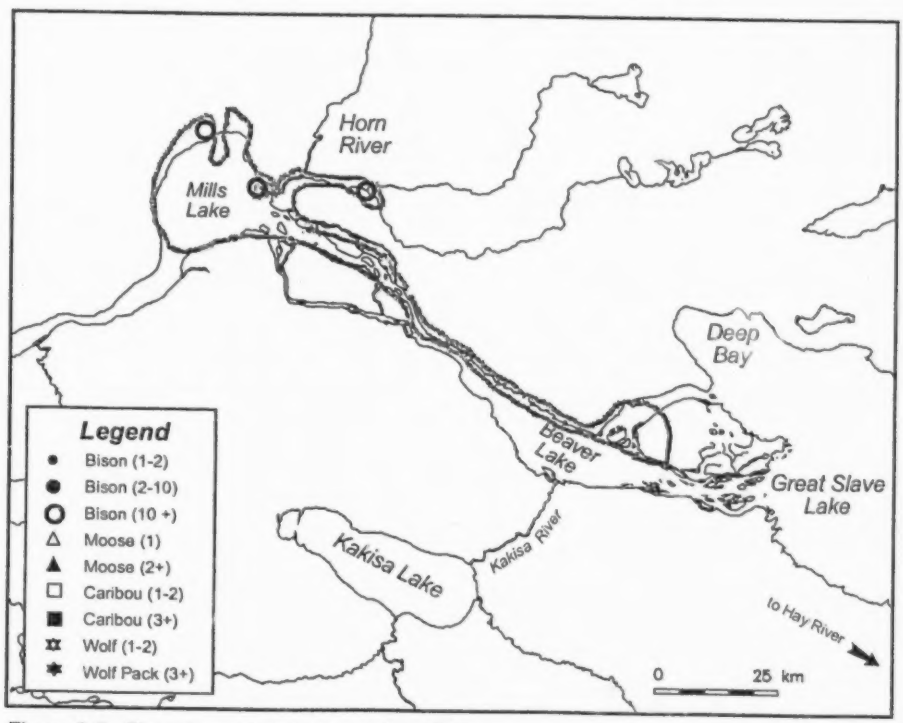

Figure 3.2. Shoreline patrol, 31 December 1998.

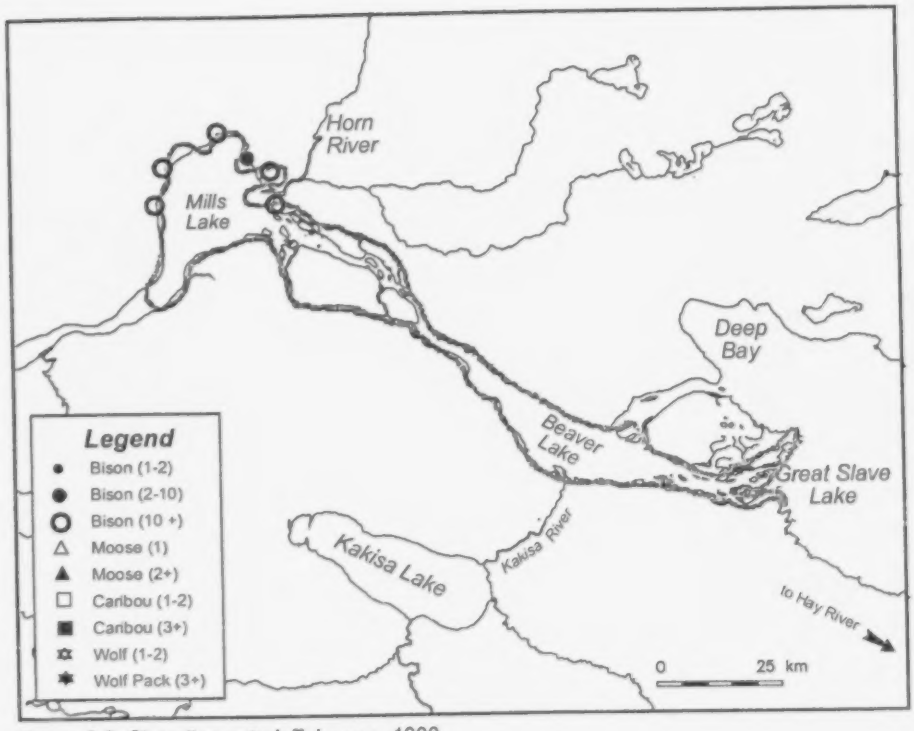

Figure 3.3. Shoreline patrol, 7 January 1999.

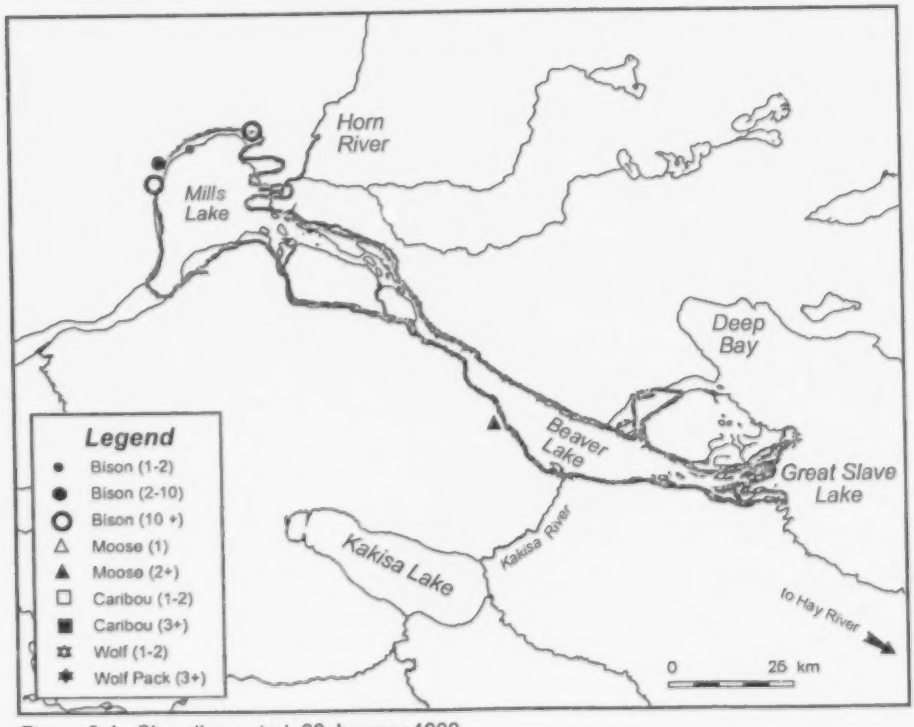

Figure 3.4. Shoreline patrol, 20 January 1999.

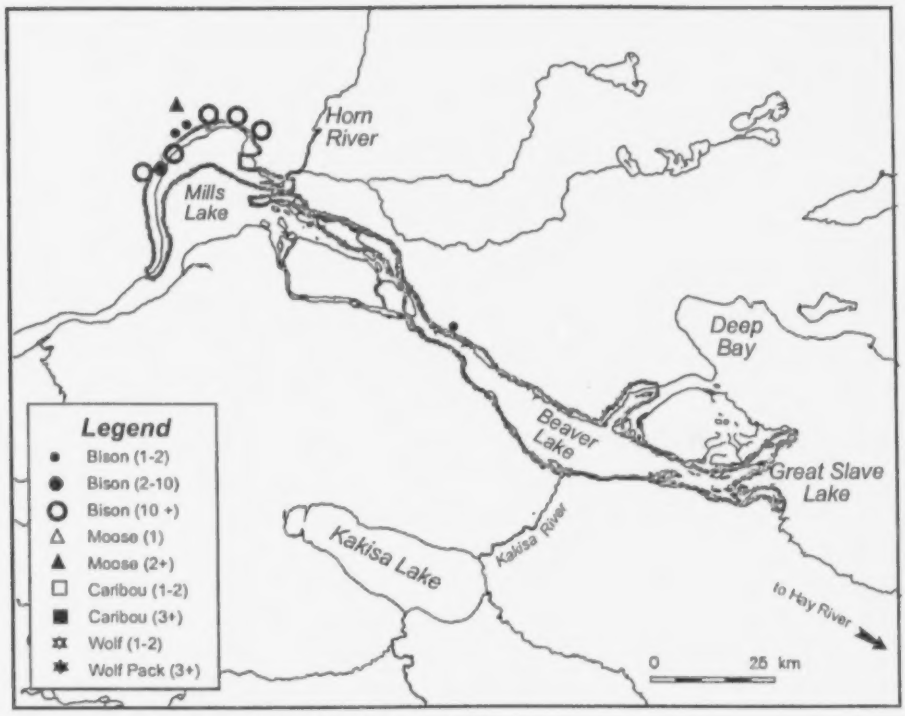

Figure 3.5. Shoreline patrol, 27-28 January 1999.

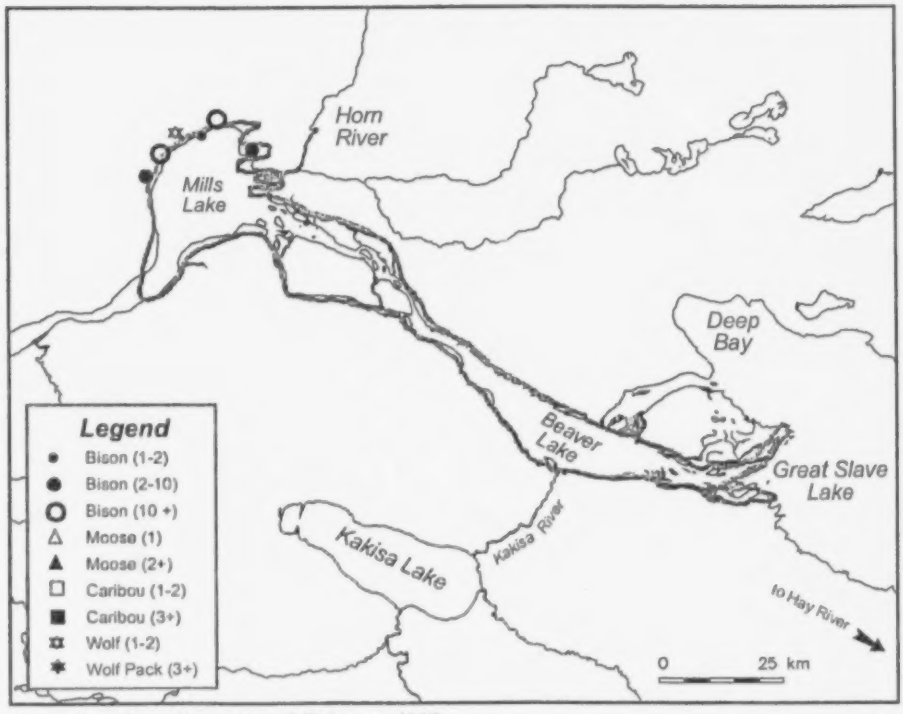

Figure 3.6. Shoreline patrol, 3 February 1999.

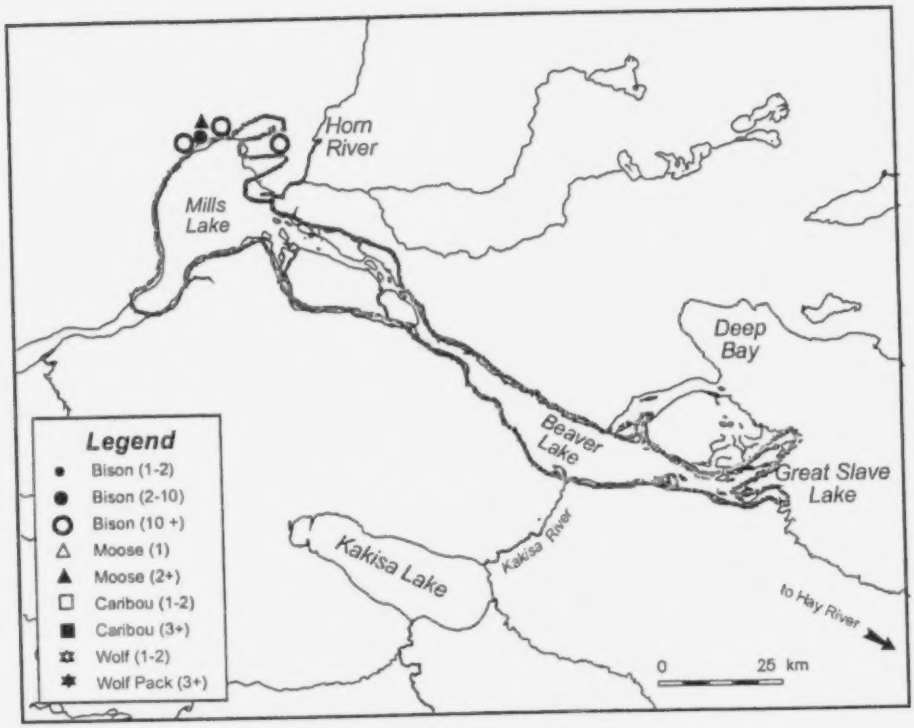

Figure 3.7. Shoreline patrol, February 10, 1999.

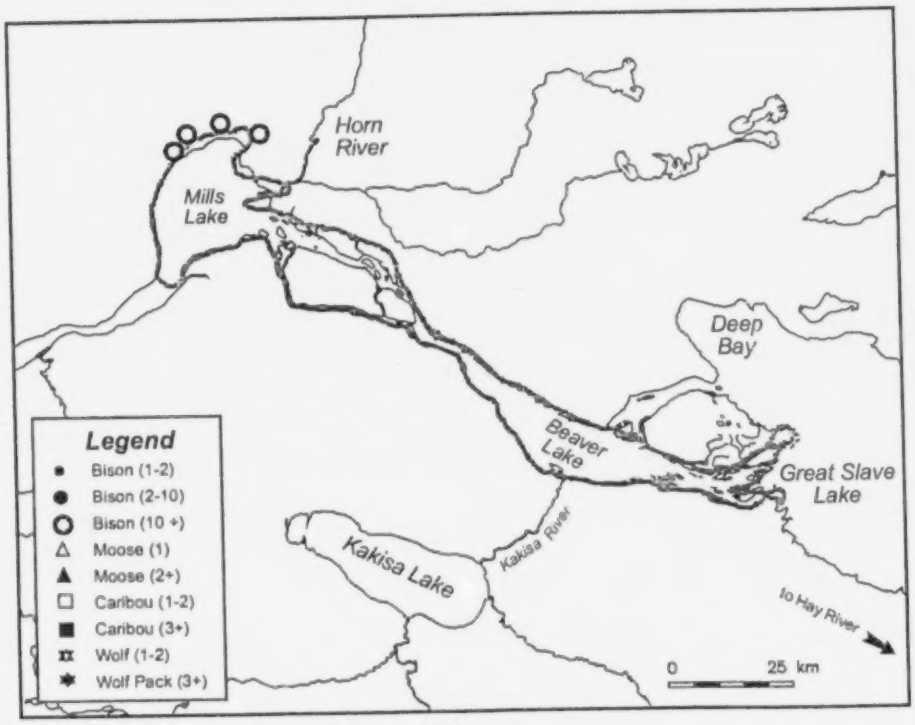

Figure 3.8. Shoreline patrol, 24 February 1999.

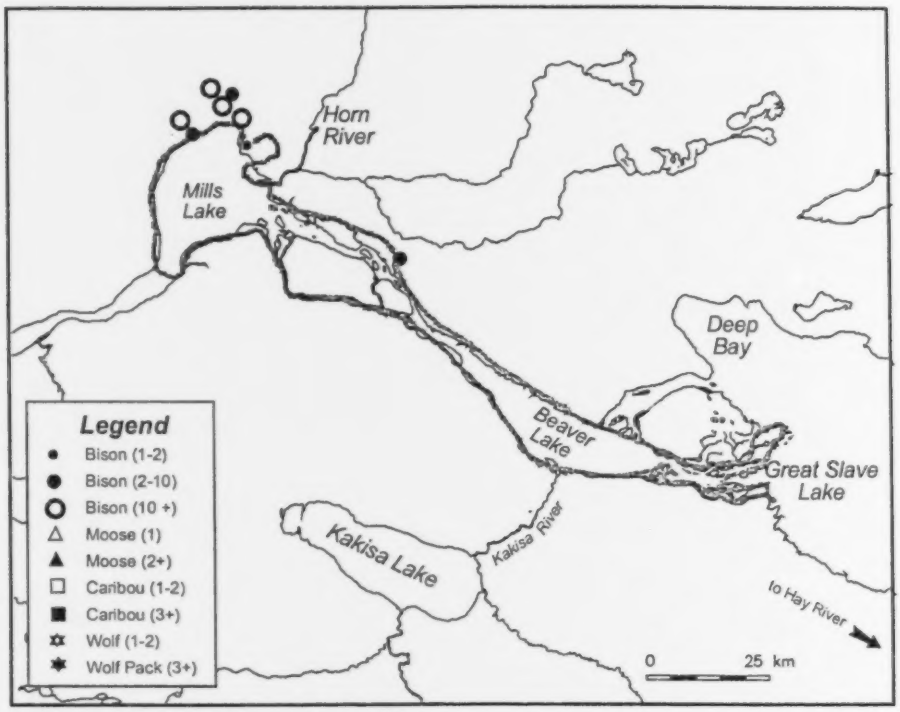

Figure 3.9. Shoreline patrol, 2 March 1999.

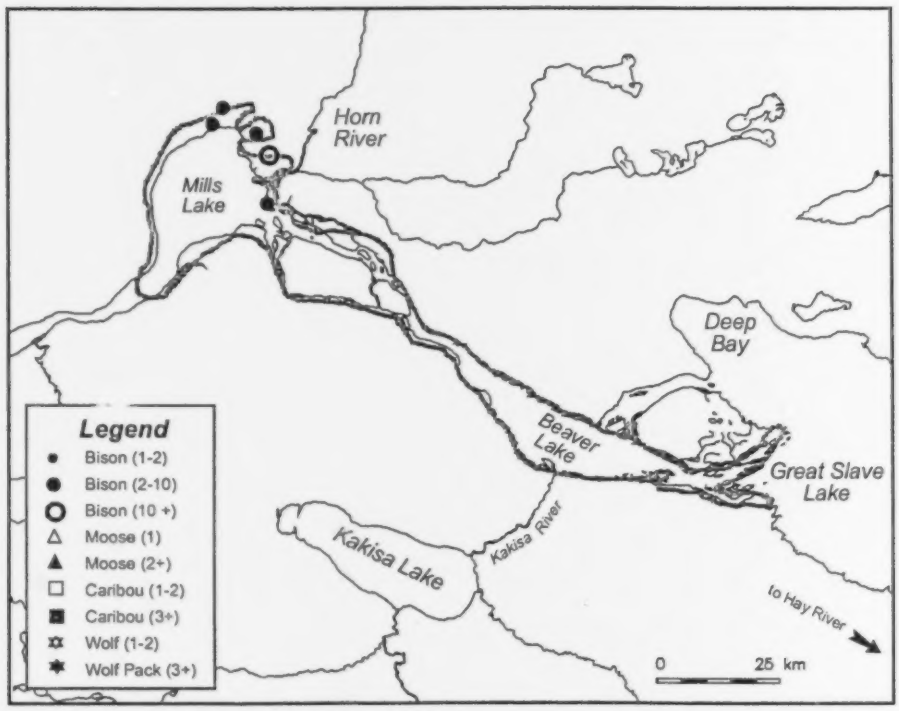

Figure 3.10. Shoreline patrol, 10 March 1999.

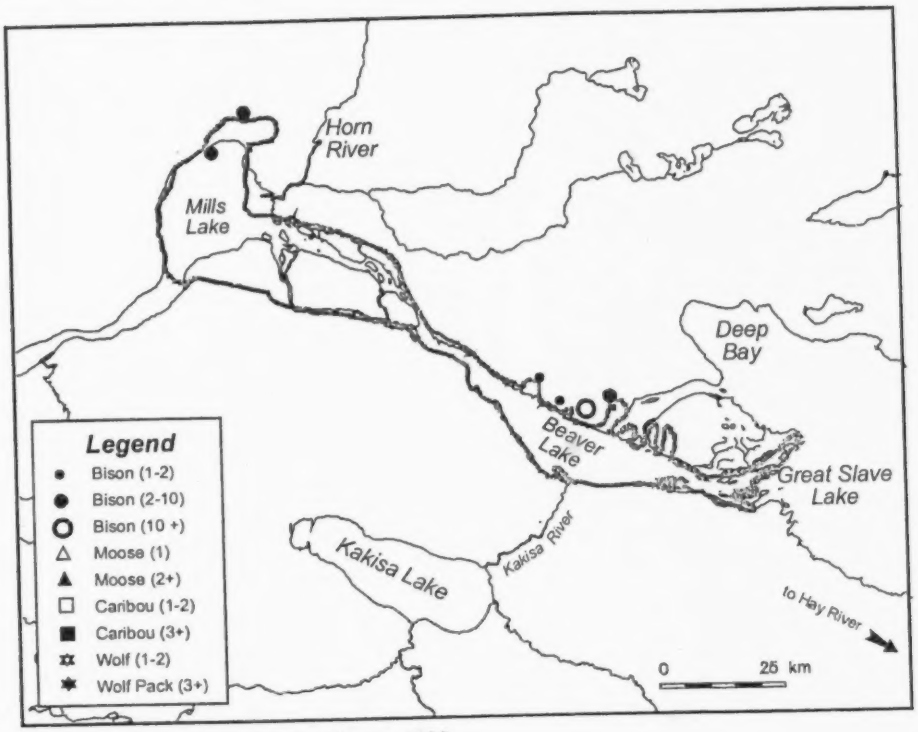

Figure 3.11. Shoreline patrol, 24 March 1999.

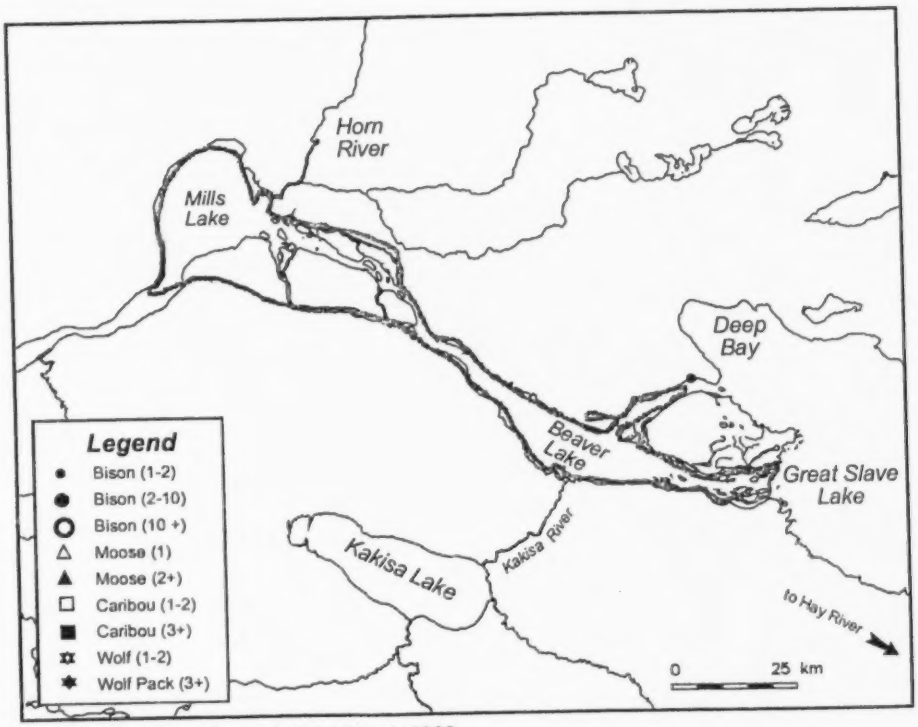

Figure 3.12. Shoreline patrol, 31 March 1999.

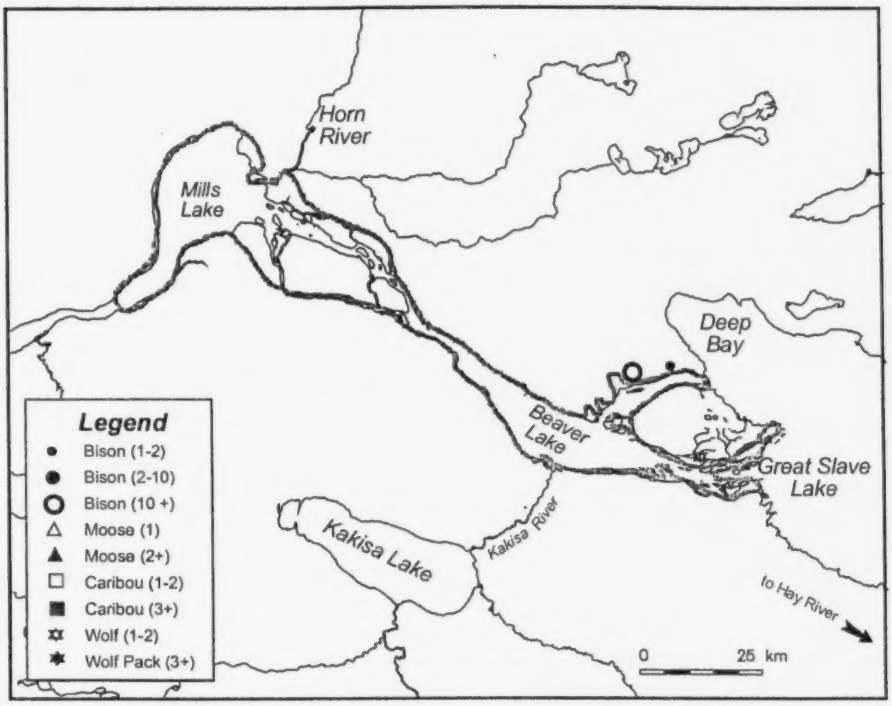

Figure 3.13. Shoreline patrol, 7 April 1999.

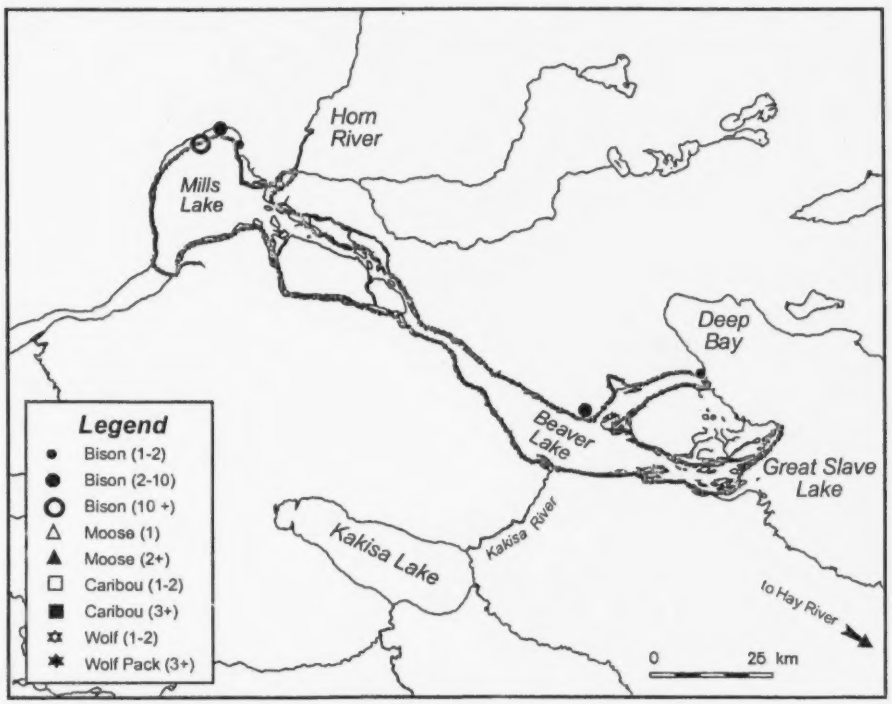

Figure 4.14. Shoreline patrol, 14 April 1999.

Table 1. Summary of shoreline patrols in the Bison Control Area from December 1998 to April 1999.

Date	Hours flown	Date	Hours flown
23 Dec 1998	3.0	24 Feb 1999	2.7
31 Dec 1998	2.5	2 Mar 1999	3.0
7 Jan 1999	3.0	10 Mar 1999	3.0
20 Jan 1999	3.3	24 Mar 1999	2.9
27-28 Jan 1999	3.5	31 Mar 1999	3.0
3 Feb 1999	3.0	7 Apr 1999	2.8
10 Feb 1999	3.0	14 Apr 1999	4.0

Total: 42.7 hours

Table 2. Summary of surveillance flights in the Bison Control Area during January, February and March 1999.

Date	BCA Zone	Hours flown
12-14 Jan 1999	I	13.6
16-18 Feb 1999	I	16.3
16-20 Mar 1999	I and II	44.7

Total: 74.6 hours

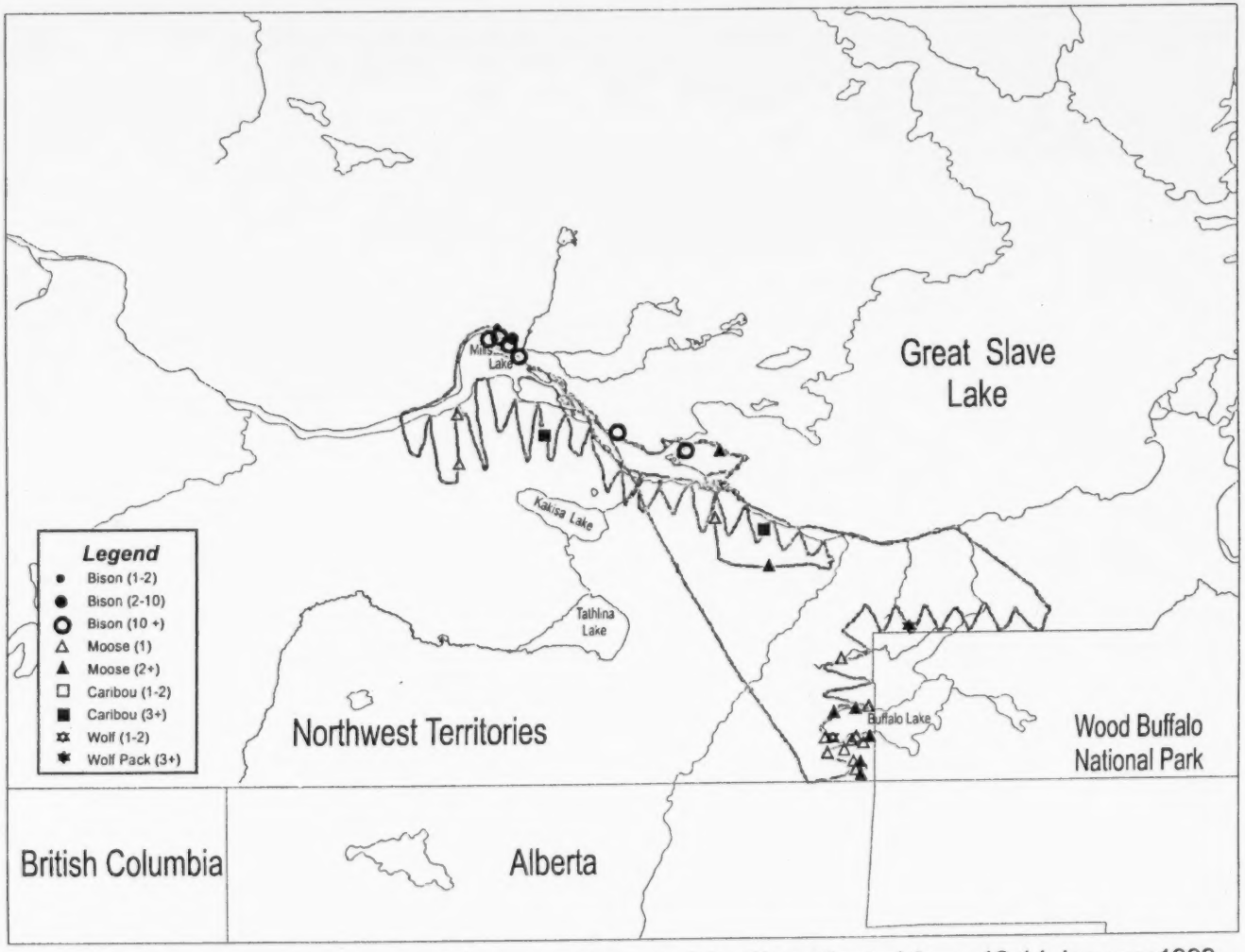

Figure 4.1. Semi-comprehensive aerial survey of Zone I of the Bison Control Area, 12-14 January 1999.

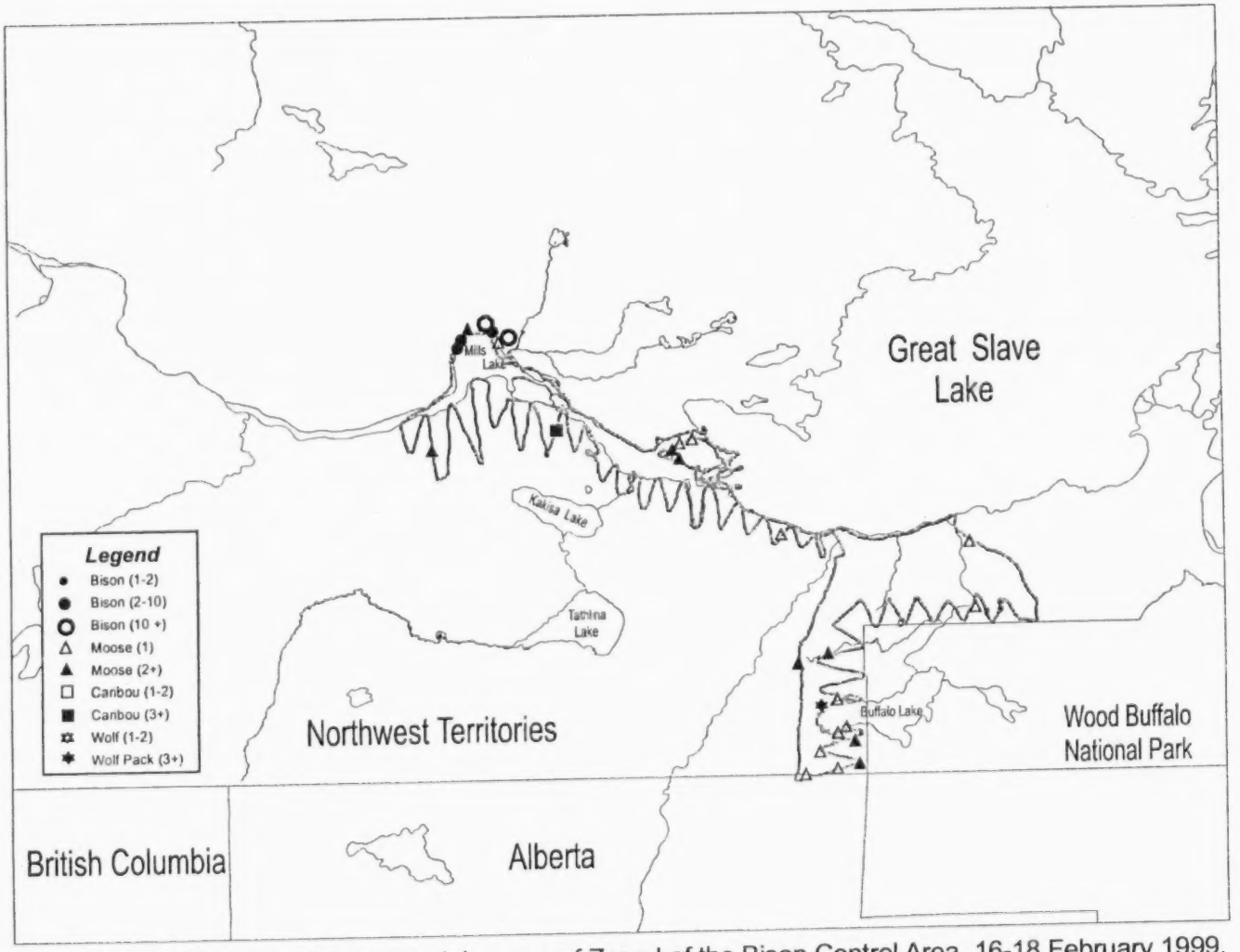

Figure 4.2. Semi-comprehensive aerial survey of Zone I of the Bison Control Area, 16-18 February 1999.

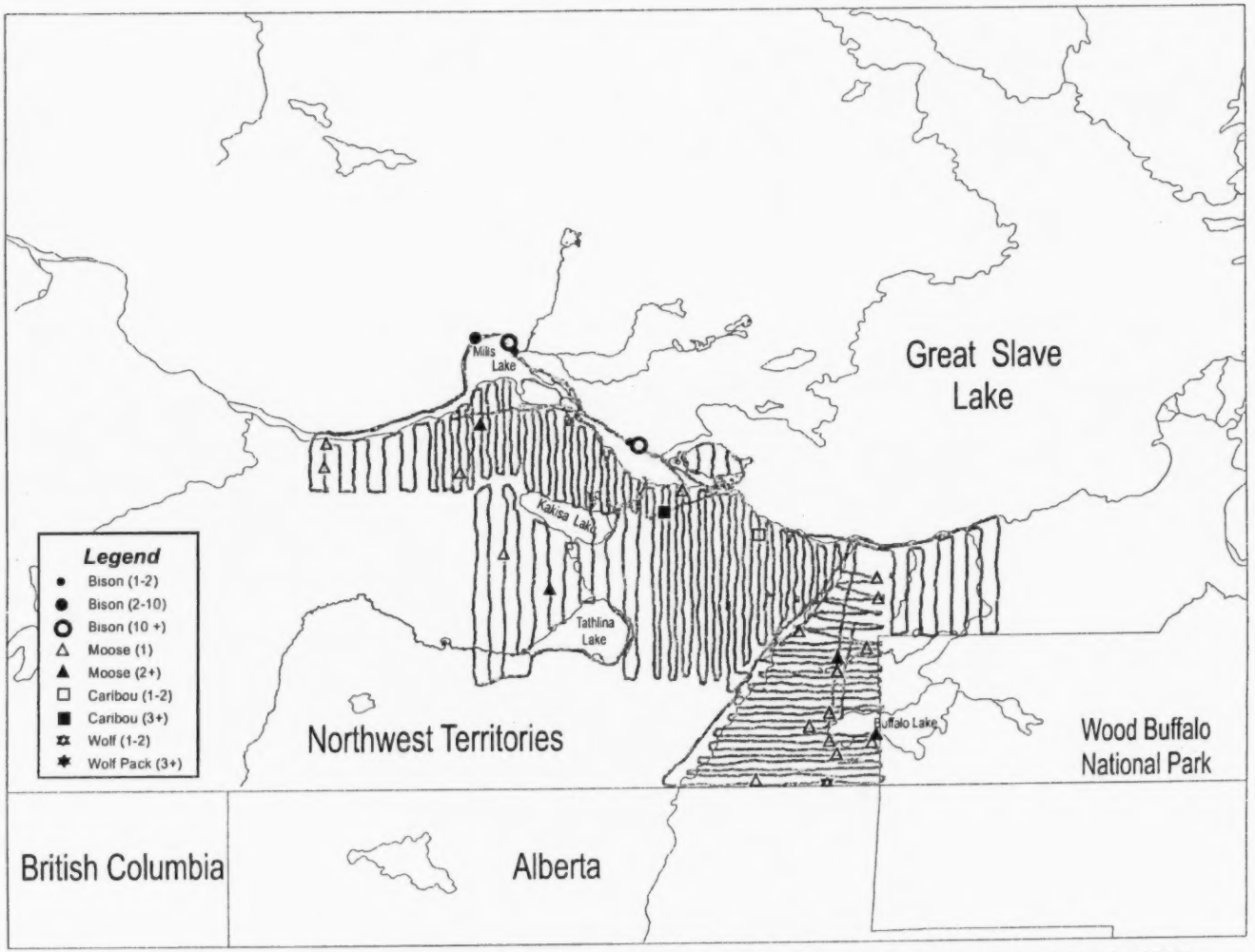

Figure 5. Comprehensive aerial survey of Zone I and II of the Bison Control Area, 16-20 March 1999.

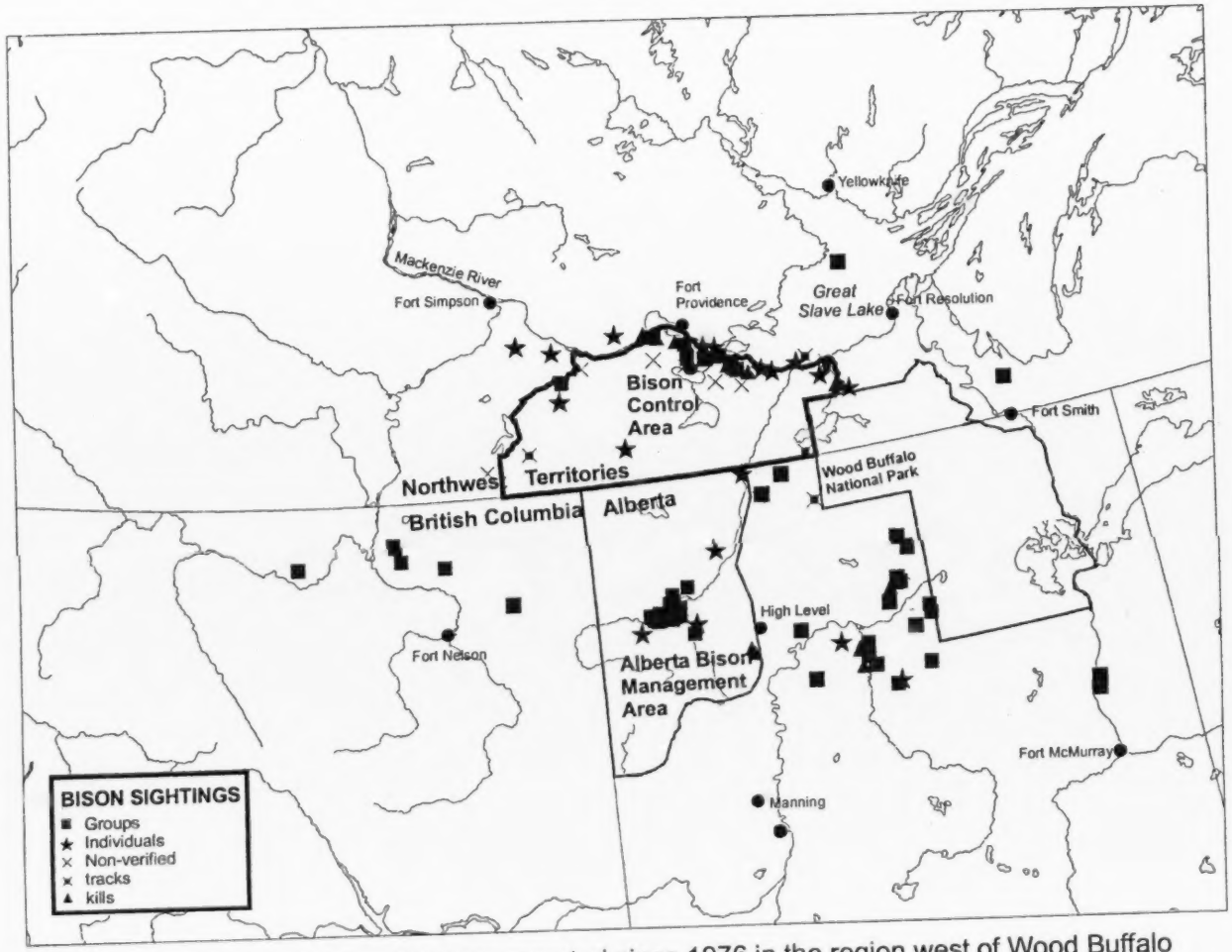

Figure 6. Distribution of bison sightings reported since 1976 in the region west of Wood Buffalo National Park and south Mackenzie River.

The cumulative totals of large mammals observed during shoreline patrols and surveillance flights were 1,588 bison, 19 caribou, 92 moose, and 23 wolves (Table 3).

Table 3. Recorded sightings of large mammals observed during all surveillance flights in the Bison Control Area, December 1998 - April 1999.

Species	Shoreline patrols (n = 14)	Surveillance flights	
		Semi-Comprehensive (n=2)	Comprehensive (n=1)
Bison	1340	189	59
Caribou	0	15	4
Moose	6	62	24
Wolf	1	21	1

During the annual comprehensive flight, we identified and delineated areas with potential bison habitat (Figure 7). These areas were similar to those observed during previous years (Bohnet and Gates 1997, Boulanger *et al.* 1999). However, because we only identified potential bison habitat from aerial surveys in winter, further investigation is required during the growing season to better assess their suitability. Potential areas of habitat have particular relevance to the BCP because it may allow us to better predict where bison would most likely occur within and disperse through the BCA.

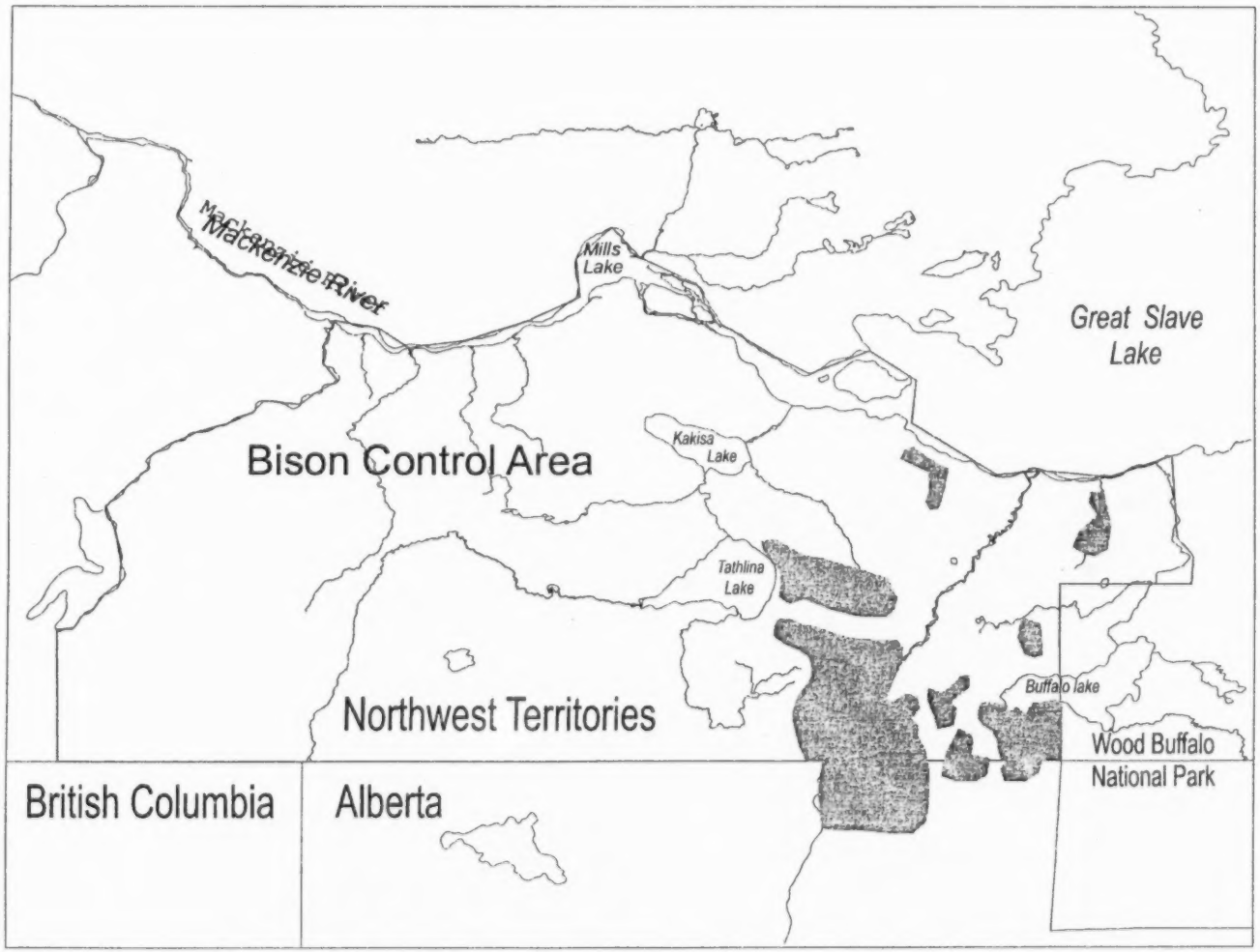

Figure 7. Possible bison habitat (dark grey areas) identified during aerial surveys in 1997-1999.

The research by the University of Calgary (Gates *et al.* 1999) proposes to improve and expand on the APFRAN (1998) risk model by combining biophysical data from satellite imagery and local knowledge sources into a landscape model of bison distribution and movements in defined risk areas around WBNP. Through collaboration with the BCP, the research may provide a useful approach to evaluating potential dispersal routes of bison through the BCA.

Communications

We made a concerted effort to increase public awareness of the BCP by distributing information posters and pamphlets to communities and public outlets in and around the BCA. We used posters designed during the previous year to present the public with specific information on brucellosis and tuberculosis in bison (Appendix B).

A radio announcement was aired periodically on the Canadian Broadcasting Corporation (CBC) to inform the public about the BCP and alert anyone travelling through the BCA to report bison sightings to the nearest Department of Resources, Wildlife and Economic Development office (Appendix C). This radio message was also aired as an "Anik-info" spot on CBC-North television from the beginning of November 1998 until April 1999.

An advertisement placed in "Up Here" magazine (Appendix D) the previous year was updated and published in March of 1999. The "Up Here"

advertisement was designed to reach a wider audience. It was designed to inform the public about the BCP and its goals, and to solicit public participation.

Community Consultations and Concerns

An important part of the BCP is reporting of bison sightings by the general public. Therefore, it is essential that people from communities in and near the BCA, are well-informed about the program. Attempts were made to organize meetings with the communities surrounding the BCA but due to conflicting schedules, only one was successful. A presentation was made by the Bison Control Technician at Trout Lake to Sambaa K'e First Nation on 15 February 1999. The audience included members of the Band Council, resource users and interested persons. The 12 participants showed interest in the program as a whole and recounted previous sightings (4 to 5 years ago) of bison and location of suitable bison habitat in the BCA. (Appendix E).

RECOMMENDATIONS

1. Bison were not sighted in the BCA during the weekly shoreline patrols nor the monthly and annual surveillance surveys conducted in the 1997-1998 season. Nevertheless, these surveys should continue so that we may confirm that bison are not present in the BCA. Absence of bison in the BCA should not be presumed.

2. As part of the annual survey of BCA Zones I and II, we also delineated habitat that may be suitable for bison. We suggest that additional work in the BCA be conducted to identify movement corridors and potential habitat for dispersing bison. The research proposed by Gates *et al.* (1999) may address this question of potential dispersal corridors in the BCA. Consequently, the Department of Resources, Wildlife, & Economic Development and Wood Buffalo National Park should collaborate on the research program as it may apply directly to improved design and delivery of the BCA program.

3. Publicity on the BCA Program was improved this season and should be expanded further next season. A well-advised public is more likely to report sightings of bison. For next season, we suggest that:

    a) meetings be held with communities in and around the BCA;

    b) radio messages be aired at the beginning of the surveillance season; and

c) information on the BCP be published in the major newspapers of the Northwest Territories in December of 1999.

4. The Bison Control Area Technician should be trained in conducting post-mortem evaluations, including proper blood collection, tissue collection and recognising gross pathology of bovine tuberculosis and brucellosis.

5. The signs currently used to inform the public about the BCA along the Mackenzie and the South Slave highway systems are ineffective. They are difficult to see and contain little information. We suggest that new signs be designed of which there could be two types. The first type would indicate the boundaries of the BCA to highway travellers. The second type of sign would be more informative. These signs should display a map, specific information on the objectives of the program, and provide contact numbers in case a traveller sees bison in the BCA. These information signs should be located at strategic areas such as campgrounds and roadside pullouts.

ACKNOWLEDGMENTS

Several individuals were instrumental in the conduct of the Bison Control Program during the 1998-1999 season. Without their support and dedicated efforts the program would not have run as smoothly. Department of Resources, Wildlife and Economic Development (RWED) personnel in Fort Providence, and Fort Smith diligently handled administrative aspects such as staffing and pay records. Renewable Resource Officers from Fort Providence (Evelyn Krutko, Rick Sanderson) assisted when possible with flights, logistics and shared their concerns and insightful advice for continued success of the Bison Control Program. We thank the community participants who assisted with the surveillance flights: Lawrence Thom and Lester Antoine of Fort Providence, and Leon Thomas and Joe Cayen of Hay River. Christian Moser flew the Cessna 185, and Ted Malewski and Christian Moser (Air Providence Ltd, Fort Providence) alternately piloted the Cessna 150. We would also like to thank the Chief and Council of the Sambaa K'e First Nation of Trout Lake for arranging the meeting at Trout Lake.

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LIST OF DATABASES

Bisobs.dbf	This database includes a list of all bison observations since 1976 in the BCA and surrounding areas; it is a Paradox database file, located on the GIS/Technician computer at the wildlife management building, Department of Resources, Wildlife and Economic Development, Hwy # 5, Fort Smith, Northwest Territories.
Bisob98.dbf	This database file lists all wildlife sightings during the 1998-99 surveillance flights of the BCA; it is a located on the GIS/technician computer at the wildlife management building, Department of Resources, Wildlife and Economic Development, Hwy # 5, Fort Smith, Northwest Territories.

APPENDIX A. Risk assessment on bovine brucellosis and tuberculosis in Wood Buffalo National Park and area (Animal, Plant and Food Health Risk Assessment Network 1998)

The risk assessment was undertaken to quantify the risk to the three *At Risk* groups, namely, cattle, commercial captive bison and disease-free free ranging bison.

The risk was estimated by the model: $I \times C \times T \times E$

Where,

I = Probability of invasion
C= Probability of Contact I Invasion
T = Probalility of Transmission I Invasion I Contact
E = Consequences I Invasion $\cap$ Contact $\cap$ Transmission

For the disease-free free ranging bison component of the assessment, the Mackenzie Bison Sanctuary herd and the Hay-Zama herd were selected because they are the closest to infected bison. Computer simulation of the mathematical model used to estimate the risk of *Brucella abortus* or *Mycobacterium bovis* from bison in WBNP and area in a 12-month period are as follows:

One can state with a 95% confidence that on average the introduction of infection would occur no more frequently than once every number of years *if populations remain at 1998 levels.*

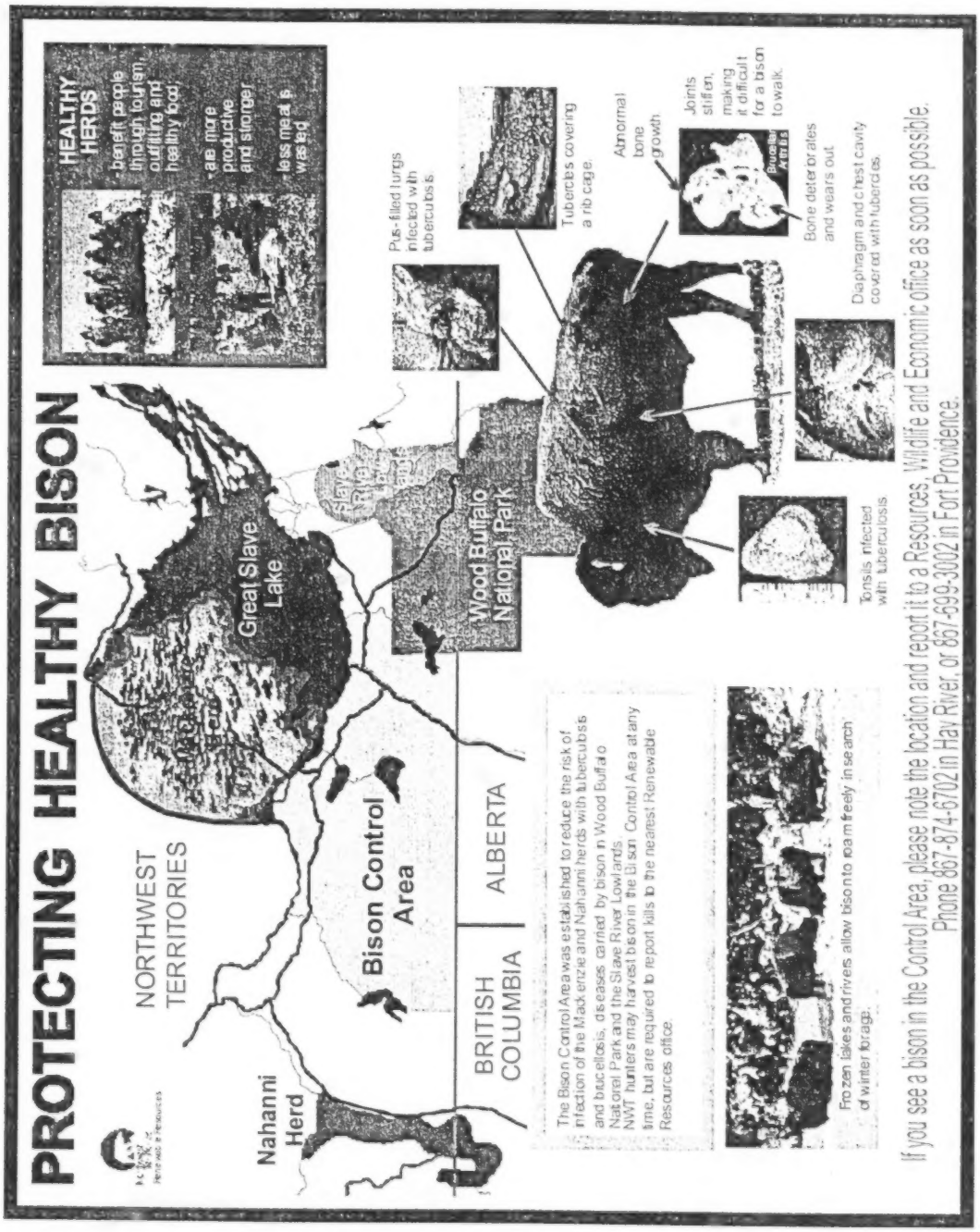
Target group	*Brucella abortus*	*Mycobacterium bovis*
Commercial Captive Bison	229 years	173 years
Cattle	1276 years	1764 years
Disease-Free, Free-Ranging Bison	8 years	6 years

This risk assessment does not include GIS (Global Information System). Inclusion of GIS variables in the model may increase the overall risk estimate (APFRAN 1998).

APPENDIX B. Poster distributed to user groups and commercial operators.

PROTECTING HEALTHY BISON
NORTHWEST TERRITORIES
Great Slave Lake
Slave River Lowlands
Wood Buffalo National Park
Nahanni Herd
Bison Control Area
BRITISH COLUMBIA
ALBERTA
HEALTHY HERDS
- benefit people through tourism, outfitting and healthy food;
- are more productive and stronger
- less meat is wasted
Pus-filled lungs infected with tuberculosis.
Tubercles covering a rib cage.
Abnormal bone growth.
Joints stiffen, making it difficult for a bison to walk.
Bone deteriorates and wears out.
Diaphragm and chest cavity covered with tubercles.
Tonsils infected with tuberculosis.
The Bison Control Area was established to reduce the risk of infection of the Mackenzie and Nahanni herds with tuberculosis and brucellosis, diseases carried by bison in Wood Buffalo National Park and the Slave River Lowlands. NWT hunters may harvest bison in the Bison Control Area at any time, but are required to report kills to the nearest Renewable Resources office.
Frozen lakes and rivers allow bison to roam freely in search of winter forage.
If you see a bison in the Control Area, please note the location and report it to a Resources, Wildlife and Economic office as soon as possible.
Phone 867-874-6702 in Hay River, or 867-699-3002 in Fort Providence.

APPENDIX B. Poster distributed to user groups and commercial operators.


PROTECTING HEALTHY BISON
NORTHWEST TERRITORIES
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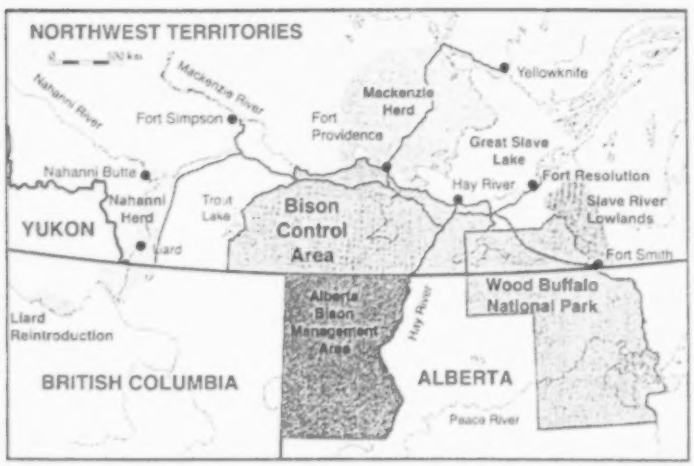
Phone 867-874-6702 in Hay River, or 867-699-3002 in Fort Providence.

APPENDIX D. Advertisement published in "UP HERE" magazine.

IF YOU SEE A BISON in the control area...

Bison populations in the Slave River Lowlands and the Wood Buffalo National Park area are infected with bovine tuberculosis and brucellosis. In 1987, the Bison Control Area (BCA) was created to prevent the spread of these diseases to the healthy Mackenzie and Nahanni herds.



The BCA (see map) acts as a buffer zone between diseased and healthy bison populations. Since bison are sporadically observed in the BCA, active management is necessary to curtail their movement and reduce the risk of transmission. All bison in the BCA are presumed disease-carriers and must be removed and tested. Success of this management effort is the result of cooperation between the public and various government agencies.

If you see a bison in the BCA, please report as soon as possible to the nearest Resource, Wildlife and Economic Development office. Under the Northwest Territories Wildlife Regulations, a resident may at any-time hunt bison within the BCA. A hunter who kills a bison in the BCA is required to report the occurrence as soon as practical to the nearest Resource, Wildlife and Economic Development office.

The Governments of the Northwest Territories, Alberta, and British Columbia have been working towards recovery of healthy wood bison populations. In the Northwest Territories, two herds have been reestablished and are disease-free. The Mackenzie herd numbers approximately 2000 animals, and represent the largest contiguous free roaming herd of healthy wood bison in Canada a cornerstone in the nation's wood bison recovery program. The Nahanni herd now numbers about 150 animals.

If you would like more information regarding the Bison Control Program, please contact any Resource, Wildlife and economic Development office.

IF YOU SEE A BISON IN THE BISON CONTROL AREA
Phone: Fort Providence 1-867-699-3002, Hay River 1-867-874-6702, Fort Smith 1-867-872-6400